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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/073,223	02/13/2002	Tsunehiro Nishi	KOJIM-446	4806
23599	7590	04/12/2004	EXAMINER	
MILLEN, WHITE, ZELANO & BRANIGAN, P.C. 2200 CLARENDON BLVD. SUITE 1400 ARLINGTON, VA 22201			LEE, SIN J	
			ART UNIT	PAPER NUMBER
			1752	

DATE MAILED: 04/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/073,223

Applicant(s)

NISHI ET AL.

Examiner

Sin J. Lee

Art Unit

1752

ed

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1 and 3-5 is/are allowed.
- 6) ☒ Claim(s) 6-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. Claim 2 is canceled by applicants.
2. In view of the amendment filed on January 9, 2004, the previous 102(b) rejections on claims 1-4 over Nozaki et al'713 are hereby withdrawn because Nozaki's copolymer does not contain both of the present repeating units x1 and x2 together, both of the present repeating units x1 and x3 together, or both of the present repeating units x2 and x3 together.
3. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 13-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In the last two lines of claim 13, applicants recite, "x3, a, b and c are numbers inclusive of 0, . . . , x3 is not equal to 0." Are applicants saying that x3 can be 0 or not? For the purpose of examining the claim on the merit, the Examiner assumed that applicants meant to say "a, b and c are numbers inclusive of 0, . . . , x3 is not equal to 0." Appropriate correction is required.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

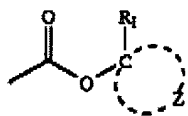
7. Claims 6-8 and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nozaki et al (5,968,713).

With respect to present claim 6, in Example 86, Nozaki makes a copolymer of 2-methyl-2-adamantyl methacrylate and vinyl acetate (see the chemical structure in col.79, lines 10-20) which has the Mw of 8,200. In this copolymer, the vinyl acetate unit teaches present repeat unit "x1": present R¹, R², and R⁴ would all be hydrogen atoms and present R³ would be a monovalent hydrocarbon group of 2 carbon atoms which

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may contain a hetero atom. Besides, Nozaki's vinyl acetate unit is also listed in the present specification (pg.14) as one of the examples for the present repeat unit "x1".

Nozaki teaches the equivalence of the 2-methyl-2-adamantyl methacrylate repeat unit of his copolymer and 2-methyl-2-norbornyl methacrylate repeat unit in col.15, lines 34-37, lines 50-55, col.10, lines 57-67, col.11, lines 1-3, col.13, lines 21-32, col.10, lines 39-41. That is, the 2-methyl-2-admantyl methacrylate repeat unit has the following moiety

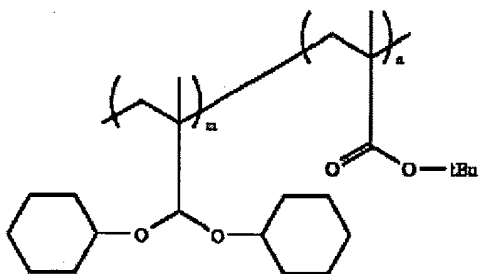


in which R_1 is a methyl group, and Z represents atoms necessary to complete an adamantyl group (*an alicyclic hydrocarbon group*) along with a carbon atom to which the R_1 group is bonded. Because Nozaki teaches the equivalence of adamantane and norbornane as alicyclic hydrocarbon groups, it would have been obvious to one of ordinary skill in the art to replace the adamantyl group in the 2-methyl-2-admantyl methacrylate repeat unit with a norbornyl group to make *2-methyl-2-norbornyl methacrylate repeat unit*. Therefore, Nozaki's teaching renders obvious a copolymer of 2-methyl-2-norbornyl methacrylate and vinyl acetate. In this copolymer, the 2-methyl-2-norbornyl methacrylate repeat unit teaches present repeat unit "d" (R^{16} would be a hydrogen atom, R^{15} would be a methyl group, and R^{21} would be the acid labile group of the present formula (L4) in which R^{L06} is a methyl group (a monovalent hydrocarbon group of 1 carbon atom), and R^{L07} - R^{L16} are all hydrogen atoms).

Since "a", "b", and "c" can all be zeros in present claim 6, Nozaki's copolymer of 2-methyl-2-norbornyl methacrylate and vinyl acetate teaches present polymer of claim 6. Also, since Nozaki's copolymer of 2-methyl-2-norbornyl methacrylate and vinyl acetate does not contain any other repeat units than 2-methyl-2-norbornyl methacrylate and vinyl acetate, Nozaki's copolymer of 2-methyl-2-norbornyl methacrylate and vinyl acetate satisfies present equation $X1 + a + b + c + d = 1$. Therefore, Nozaki's teaching would render obvious present invention of claim 6.

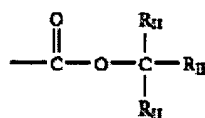
In Example 87, Nozaki combines his copolymer with a photoacid generator to make a resist solution. The resist solution is spin-coated onto a silicon substrate and prefaced at 230°C for 60 seconds to form a resist coating. The resist coating is then selectively exposed to a pattern of laser light having a wavelength of 193 nm or 248 nm. The exposed resist coating is then subjected to the post exposure baking at 150°C for 60 seconds, and the post baked resist coating is developed with an aqueous solution of 2.38 wt% of TMAH for 60 seconds to form a positive resist patterns. Therefore, Nozaki's teaching would render obvious present inventions of claims 7 and 8.

With respect to present claim 13, In Example 44, Nozaki makes a copolymer (Mw of 16,000) having the following structure:

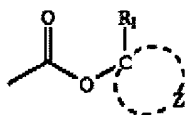


The first repeat unit of this copolymer teaches present repeat unit "x3": present R⁹ and R¹⁴ would both be hydrogen atoms; present R¹⁰ would be a methyl group; present R¹³ would be a cyclic monovalent hydrocarbon group of 6 carbon atoms; present R¹² would be a hydrogen atom, and present R¹¹ would be a cyclic, monovalent hydrocarbon group of 6 carbon atoms which contains a hetero atom (oxygen atoms).

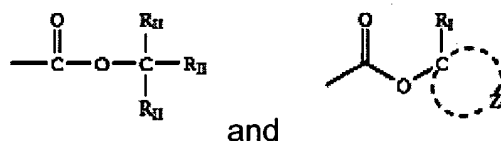
The second repeat unit of Nozaki's copolymer of Example 44 has the following moiety



in which all of R₁s represents methyl groups (see col.15, lines 34-60). Nozaki teaches the equivalence of this moiety and the following moiety



as protected carboxylic acid groups (protected alkali-soluble groups) that can be used in his invention. In the latter moiety, Z represents atoms necessary to complete an *alicyclic hydrocarbon group* along with a carbon atom to which the R₁ is bonded, and R₁ represents a methyl, ethyl, or a propyl group (see col.10, lines 39-41, lines 57-67, col.11, lines 1-3). Nozaki furthermore teaches (col.13, lines 21-40) 9 preferable examples for the alicyclic hydrocarbon group, one of which is a norbornyl group. Since the prior art teaches the equivalence of those two moieties



, and since there are only 9 preferred examples given for the alicyclic hydrocarbon group represented by Z and only 3 examples for the R₁ group, it would have been obvious to one of ordinary skill in the art to replace the second repeat unit of Nozaki's copolymer of Example 44 with the repeat unit of 2-methyl-2-norbornyl methacrylate with a reasonable expectation of obtaining a resist material capable of exactly and faithfully reproducing the fine patterns of the exposure mask used. Therefore, Nozaki's teaching renders obvious the copolymer of his Example 44 in which the second repeat unit is replaced with the repeat unit of 2-methyl-2-norbornyl methacrylate. The repeat unit of 2-methyl-2-norbornyl methacrylate teaches present repeat unit "d" (R¹⁶" would be a hydrogen atom, R¹⁵" would be a methyl group, and R²¹ would be the acid labile group of the present formula (L4) in which R^{L06} is a methyl group (a monovalent hydrocarbon group of 1 carbon atom), and R^{L07}-R^{L16} are all hydrogen atoms).

Since "a", "b", and "c" can all be zeros in present claim 13, Nozaki's copolymer of his Example 44, in which the second repeat unit is replaced with the repeat unit of 2-methyl-2-norbornyl methacrylate, teaches present polymer of claim 13. Also, since Nozaki's copolymer does not contain any other repeat units, Nozaki's copolymer satisfies present equation $X3 + a + b + c + d = 1$. Therefore, Nozaki's teaching would render obvious present invention of claim 13.

With respect to present claims 14 and 15, Nozaki (see Example 44 and 36) combines his copolymer with a photoacid generator to make a resist solution. The

resist solution is spin-coated onto a silicon substrate and prebaked at 100°C for 60 seconds to form a resist coating. The resist coating is then selectively exposed to a pattern of laser light having a wavelength of 193 nm. The exposed resist coating is then subjected to the post exposure baking at 150°C for 60 seconds, and the post baked resist coating is developed to form a positive resist patterns. Therefore, Nozaki's teaching would render obvious present inventions of claims 14 and 15.

8. Claims 9-12 are rejected under 35 U.S.C. 103(a) as being obvious over Nishi et al (6,512,067 B2).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned

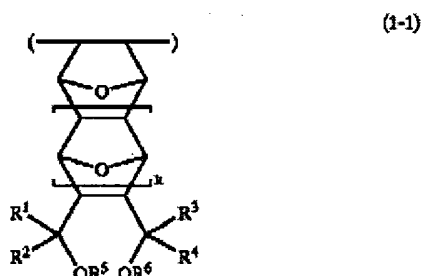
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by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(I)(1) and § 706.02(I)(2).

Claim 1 of Nishi et al states the following:

1. A polymer comprising recurring units of the following

general formula (1-1) and having a weight average molecular weight of 1,000 to 500,000,



wherein

R¹, R², R³, and R⁴ each are hydrogen or a straight, branched or cyclic alkyl group of 1 to 15 carbon atoms, R¹ and R², and R³ and R⁴, taken together, may form a ring, wherein each combination of R¹ with R² and of R³ with R⁴ is a straight, branched or cyclic alkylene group of 2 to 15 carbon atoms,

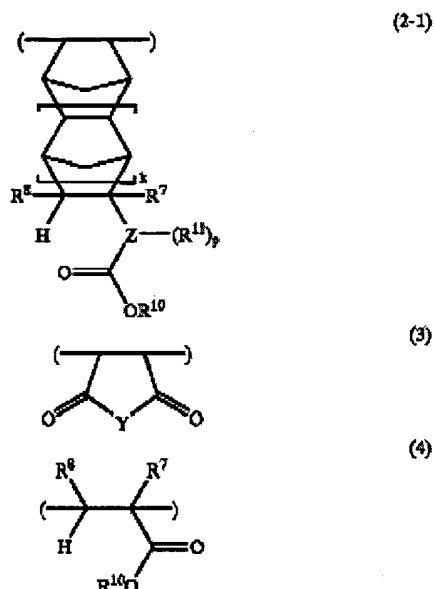
R⁵ and R⁶ each are hydrogen, a straight, branched or cyclic alkyl, acyl or alkylsulfonyl group of 1 to 15 carbon atoms or a straight, branched or cyclic alkoxy-carbonyl or alkoxyalkyl group of 2 to 15 carbon atoms, in which some or substituted with halogen atoms, and

k is 0 or 1.

Claim 4 of Nishi et al states the following:

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4. The polymer of claim 1 comprising, in addition to the recurring units of formula (1-1), recurring units of the following general formula (4) alone or in combination with recurring units of the following general formula (2-1), and recurring units of the following general formula (3):

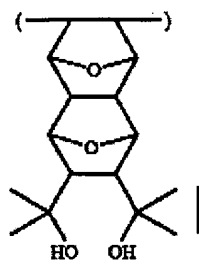


wherein k, p, R⁷ to R¹¹ and Y are as defined above.

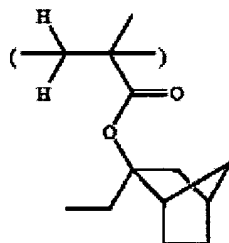
Based on Nishi's teaching in his claims 1 and 4, it would have been obvious to one of ordinary skill in the art to make Nishi's polymer that contains the recurring unit (1-1) and the recurring unit (4) alone as shown in claim 4 of Nishi with a reasonable expectation of obtaining a polymer having improved reactivity, robustness and substrate adhesion as well as minimized swell during development.

As one of 15 examples for the recurring unit (1-1), Nishi includes the following repeating unit (see col.11, lines 44-67, col.12, lines 1-65):

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Also, as one of 10 examples for the recurring unit (4), Nishi includes the following repeating unit (see col.17, lines 19-67, col.18, lines 1-13):



Since there are not that many examples to choose from, it would have been obvious to one of ordinary skill in the art to make Nishi's polymer that contains those two repeating units shown above with a reasonable expectation of obtaining a polymer having improved reactivity, robustness and substrate adhesion as well as minimized swell during development. The former repeating unit shown above teaches present repeat unit "x2" of present claim 9 because it has the same structure as that of the eighth structure shown on pg.16 of present specification as one of the examples for the present repeat unit "x2". The latter repeat unit shown above teaches present repeat unit "d" of claim 9 because present $R^{16''}$ can be H atom, $R^{15''}$ can be a methyl group, and R^{21} is an acid labile group of present formula (L4) of present claim 10 (R^{L06} is an ethyl group which is a monovalent hydrocarbon group of 2 carbon atoms, $R^{L07-L16}$ are all H atoms). Therefore, Nishi et al would render obvious present inventions of claims 9 and 10.

In his claims 9 and 12, Nishi teaches a resist composition comprising his polymer and a process for forming a resist pattern comprising the steps of applying the resist composition onto a substrate to form a coating, heat treating the coating and then exposing it to high-energy radiation or e-beams through a photomask, and optionally heat treating the exposed coating and developing it with a developer. Therefore, Nishi et al would render obvious present inventions of claims 11 and 12.

9. Claims 9-12 are rejected under 35 U.S.C. 103(a) as being obvious over Nishi et al (6,670,094 B2).

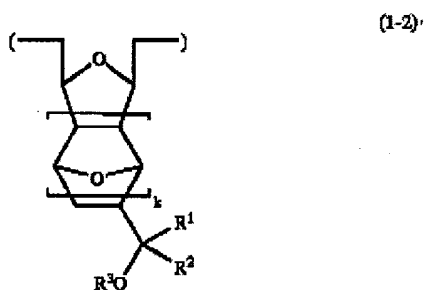
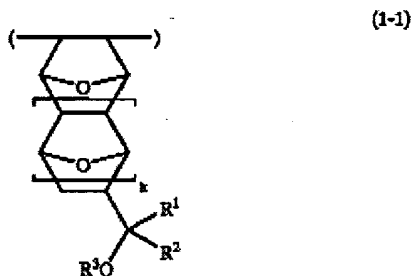
The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned

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by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(I)(1) and § 706.02(I)(2).

Claim 1 of Nishi et al states the following:

1. A polymer comprising recurring units of the following general formula (1-1) or (1-2) and having a weight average molecular weight of 1,000 to 500,000,



wherein R^1 and R^2 each are hydrogen or a straight, branched or cyclic alkyl group of 1 to 15 carbon atoms, R^1 and R^2 , taken together, may form a ring, wherein the combination of R^1 with R^2 is a straight, branched or cyclic alkylene group of 2 to 15 carbon atoms, R^3 is hydrogen, a straight, branched or cyclic alkyl, acyl or alkylsulfonyl group of 1 to 15 carbon atoms or a straight, branched or cyclic alkoxy carbonyl or alkoxyalkyl group of 2 to 15 carbon atoms, in which some or all of the hydrogen atoms on constituent

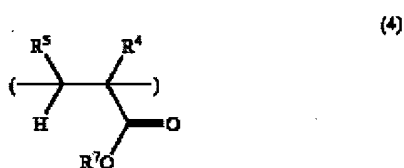
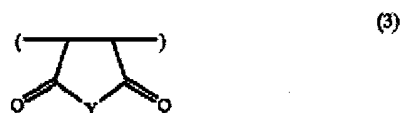
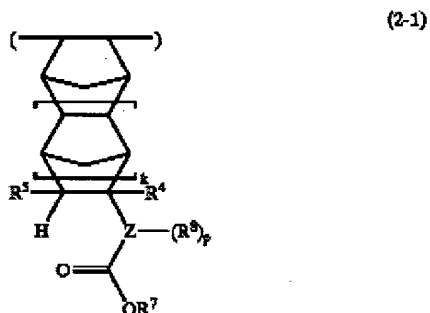
carbon atoms may be substituted with halogen atoms, with the case that all R^1 , R^2 and R^3 are hydrogen being excluded, and

k is 0 or 1.

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Claim 4 of Nishi et al states the following:

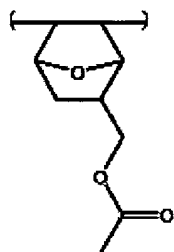
4. The polymer of claim 1 comprising, in addition to the recurring units of formula (1-1), recurring units of the following general formula (4) alone or in combination with recurring units of the following general formula (2-1), and recurring units of the following general formula (3):



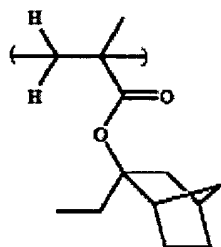
wherein k, p, R⁴ to R⁸ and Y are as defined above.

Based on the teachings of these two claims, it would have been obvious to one of ordinary skill in the art to make Nishi's polymer which contains the recurring unit of formula (1-1) and the recurring unit of formula (4) alone as shown in claim 4 of Nishi with a reasonable expectation of providing a polymer having improved reactivity, robustness and substrate adhesion as well as minimized self during development. As one of 25 examples for the recurring unit of formula (1-1), Nishi includes the following recurring unit (see col.11, lines 43-67, col.12, col.13, lines 1-10):

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Also, as one of 10 examples for the recurring unit of formula (4), Nishi includes the following recurring unit (see col.17, lines 51-67, col.18, lines 1-40):



Since there are not that many examples to choose from, it would have been obvious to one of ordinary skill in the art to make Nishi's polymer that contains those two repeating units shown above with a reasonable expectation of obtaining a polymer having improved reactivity, robustness and substrate adhesion as well as minimized swell during development. The former repeating unit shown above teaches present repeat unit "x2" of present claim 9 because it has the same structure as that of the first structure shown on pg.15 of present specification as one of the examples for the present repeat unit "x2". The latter repeat unit shown above teaches present repeat unit "d" of claim 9 because present $R^{16''}$ can be H atom, $R^{15''}$ can be a methyl group, and R^{21} is an acid labile group of present formula (L4) of present claim 10 (R^{L06} is an ethyl group which is a monovalent hydrocarbon group of 2 carbon atoms, $R^{L07-L16}$ are all H atoms). Therefore, Nishi et al would render obvious present inventions of claims 9 and 10.

In his claims 6 and 7, Nishi teaches a resist composition comprising his polymer and a process for forming a resist pattern comprising the steps of applying the resist composition onto a substrate to form a coating, heat treating the coating and then exposing it to high-energy radiation or e-beams through a photomask, and optionally heat treating the exposed coating and developing it with a developer. Therefore, Nishi et al would render obvious present inventions of claims 11 and 12.

10. Claims 9-12 are rejected under 35 U.S.C. 103(a) as being obvious over Nishi et al (6,673,517 B2).

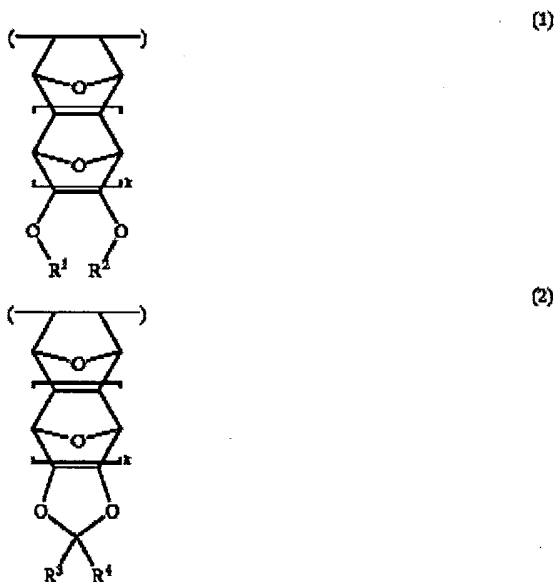
The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned

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by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(I)(1) and § 706.02(I)(2).

Claim 1 of Nishi et al states the following:

1. A polymer comprising recurring units of the following general formula (1) and/or (2) and having a weight average molecular weight of 1,000 to 500,000:



wherein R^1 and R^2 each are hydrogen, a straight, branched or cyclic alkyl, acyl or alkylsulfonyl group of 1 to 15 carbon

atoms or a straight, branched or cyclic alkoxy carbonyl or alkoxyalkyl group of 2 to 15 carbon atoms, in which some or all of the hydrogen atoms on constituent carbon atoms may be substituted with halogen atoms,

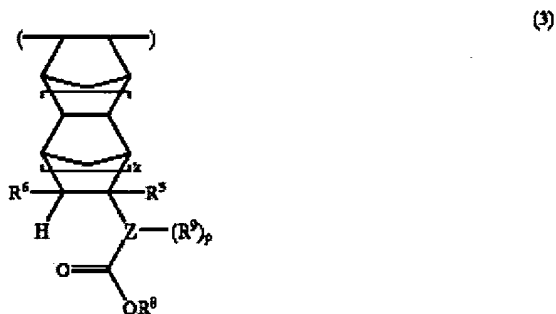
R^3 and R^4 each are hydrogen, a straight, branched or cyclic alkyl or alkoxy group of 1 to 15 carbon atoms, or a straight, branched or cyclic alkoxyalkyl group of 2 to 15 carbon atoms, in which some or all of the hydrogen atoms on constituent carbon atoms may be substituted with halogen atoms, and R^3 and R^4 may together bond with the carbon atom to form an aliphatic ring having 4 to 8 carbon atoms, or R^3 and R^4 , taken together, may be an oxygen atom,

k is 0 or 1.

Claim 4 of Nishi et al states the following:

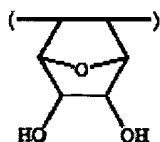
Art Unit: 1752

4. The polymer of claim 1 comprising, in addition to the recurring units of formula (1) and/or (2), recurring units of the following general formula (5) alone or in combination with recurring units of the following general formula (3), and recurring units of the following general formula (4):



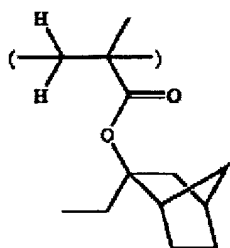
wherein k , p , R^5 to R^9 and Y are as defined above.

Based on the teachings of these two claims, it would have been obvious to one of ordinary skill in the art to make Nishi's polymer which contains the recurring unit of formula (1) and the recurring unit (5) alone as shown in claim 4 with a reasonable expectation of providing a polymer having improved reactivity, robustness and substrate adhesion as well as minimized swell during development. As one of 20 examples for the recurring unit of formula (1), Nishi includes the following recurring unit (see col.11, lines 13-67, col.12, lines 1-45):



Art Unit: 1752

Also, as one of 10 examples for the recurring unit of formula (5), Nishi includes the following recurring unit (see col.15, lines 33-65, col.16, lines 1-25):



Since there are not that many examples to choose from, it would have been obvious to one of ordinary skill in the art to make Nishi's polymer that contains those two repeating units shown above with a reasonable expectation of obtaining a polymer having improved reactivity, robustness and substrate adhesion as well as minimized swell during development. The former repeating unit shown above teaches present repeat unit "x2" of present claim 9 because it has the same structure as that of the twenty-sixth structure shown on pg.16 of present specification as one of the examples for the present repeat unit "x2". The latter repeat unit shown above teaches present repeat unit "d" of claim 9 because present $R^{16''}$ can be H atom, $R^{15''}$ can be a methyl group, and R^{21} is an acid labile group of present formula (L4) of present claim 10 (R^{L06} is an ethyl group which is a monovalent hydrocarbon group of 2 carbon atoms, $R^{L07-L16}$ are all H atoms). Therefore, Nishi et al would render obvious present inventions of claims 9 and 10.

In his claims 5 and 6, Nishi teaches a resist composition comprising his polymer and a process for forming a resist pattern comprising the steps of applying the resist composition onto a substrate to form a coating, heat treating the coating and then exposing it to high-energy radiation or e-beams through a photomask, and optionally

heat treating the exposed coating and developing it with a developer. Therefore, Nishi et al would render obvious present inventions of claims 11 and 12.

Double Patenting

11. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

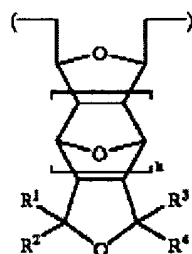
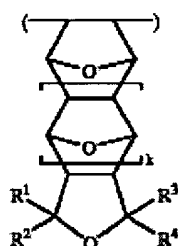
Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

12. Claims 9, 11, and 12 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 4, 6, and 7 of copending Application No. 10/126,877. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

Claim 1 of 10/126,877 states the following:

Art Unit: 1752

1. A polymer comprising recurring units of the following general formula (1-1) or (1-2) and having a weight average molecular weight of 1,000 to 500,000,

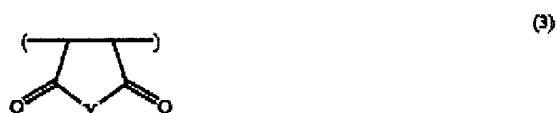
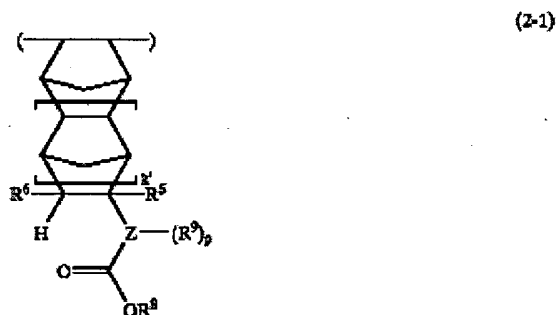


wherein each of R^1 , R^3 and R^4 is hydrogen or a straight, branched or cyclic alkyl group of 1 to 15 carbon atoms, or a pair of R^1 and R^2 and a pair of R^3 and R^4 taken together may form a ring wherein each said pair is a straight, branched or cyclic alkylene group of 2 to 15 carbon atoms and k is equal to 0 or 1.

Claim 4 states the following:

Art Unit: 1752

4. The polymer of claim 1 comprising, in addition to the recurring units of formula (1-1), recurring units of the following general formula (4) alone or in combination with recurring units of the following general formula (2-1), and recurring units of the following general formula (3):



wherein k , p , R^3 to R^9 and Y are as defined above, R^3 is hydrogen, methyl or $\text{CH}_2\text{CO}_2\text{R}^7$, R^6 is hydrogen, methyl or CO_2R^7 , R^7 which may be identical or different in R^3 and R^6 is a straight, branched or cyclic alkyl group of 1 to 15 carbon atoms, and R^8 is an acid labile group.

Based on the teachings of these two claims, it would have been obvious to one of ordinary skill in the art to make a polymer of claim 1 of App.'877 which comprises the recurring unit of the formula (1-1) and the recurring unit of the formula (4) alone as shown in claim 4. The formula (1-1) of claim 1 of App.'877 teaches present repeat unit "x2" of present claim 9 because present R^6 and R^7 can bond together to form a ring which is a cyclic hydrocarbon group of 4 carbon atoms and an oxygen atom (as hetero atom). The formula (4) of claim 4 of App.'877 teaches present repeat unit "d" because

R⁸ of the formula (4) is an acid labile group. Therefore, the teachings of claims 1 and 4 of App.'877 render obvious present invention of claim 9.

Claims 6 and 7 of App.'877 teach a process for forming a resist pattern comprising the steps of applying the resist composition of claim 6 onto a substrate to form a coating, heat treating the coating and then exposing it to high-energy radiation or e-beams through a photomask, and optionally heat treating the exposed coating and developing it with a developer. It would have been obvious to one of ordinary skill in the art to use the polymer of claim 1 of App.'877 which comprises the recurring unit of the formula (1-1) and the recurring unit of the formula (4) in the resist composition and use the composition in the process described in claim 7 of App.'877 with a reasonable expectation of obtaining a resist pattern. Therefore, claims 1, 4, 6, and 7 of App.'877 would render obvious present inventions of claims 11 and 12.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

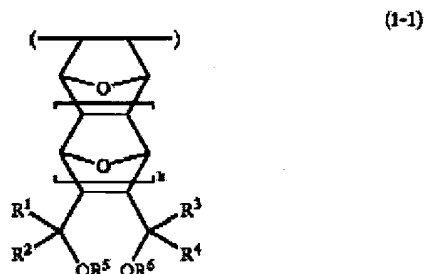
13. Claims 9, 11, and 12 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 4, 9, and 12 of U.S. Patent No. 6,512,067 B2. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

Claim 1 of Pat.'067 states the following:

Art Unit: 1752

1. A polymer comprising recurring units of the following

general formula (1-1) and having a weight average molecular weight of 1,000 to 500,000,



wherein

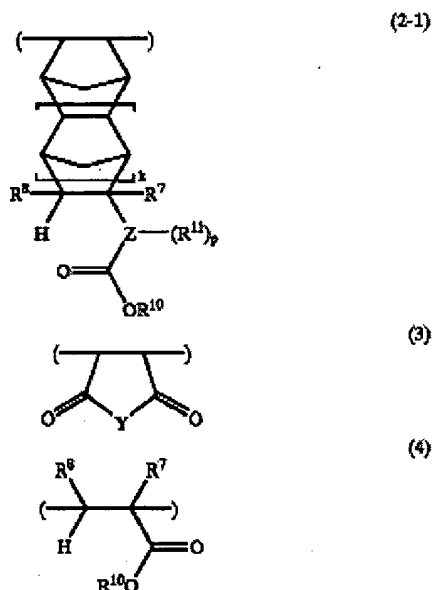
R^1 , R^2 , R^3 , and R^4 each are hydrogen or a straight, branched or cyclic alkyl group of 1 to 15 carbon atoms, R^1 and R^2 , and R^3 and R^4 , taken together, may form a ring, wherein each combination of R^1 with R^2 and of R^3 with R^4 is a straight, branched or cyclic alkylene group of 2 to 15 carbon atoms,

R^5 and R^6 each are hydrogen, a straight, branched or cyclic alkyl, acyl or alkylsulfonyl group of 1 to 15 carbon atoms or a straight, branched or cyclic alkoxy-carbonyl or alkoxyalkyl group of 2 to 15 carbon atoms, in which some or substituted with halogen atoms, and k is 0 or 1.

Claim 4 of Pat.'067 states the following:

Art Unit: 1752

4. The polymer of claim 1 comprising, in addition to the recurring units of formula (1-1), recurring units of the following general formula (4) alone or in combination with recurring units of the following general formula (2-1), and recurring units of the following general formula (3):



wherein k, p, R⁷ to R¹¹ and Y are as defined above.

Based on the teachings of these two claims, it would have been obvious to one of ordinary skill in the art to make the polymer of claim 1 of Pat.'067 which contains the recurring unit of the formula (1-1) and the recurring unit of the formula (4) alone. The recurring unit of the formula (1-1) of Pat.'067 teaches present repeat unit "x2" of present claim 9 because when R¹-R⁶ of Pat.'067 are all H atoms, and k is 1, the structure becomes the same as that of the sixth structure shown on pg.16 of present specification as one of the examples for the present repeat unit "x2". The recurring unit of the formula (4) of Pat.'067 teaches present repeat unit "d" of present claim 9 because R¹⁰ of Pat.'067 is an acid labile group. Therefore, the teaching of claims 1 and 4 of Pat.'067 renders obvious present invention of claim 9.

Art Unit: 1752

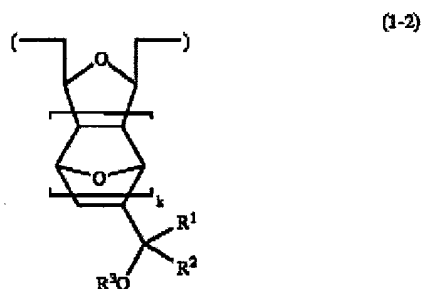
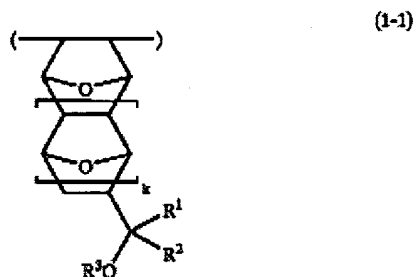
With respect to present claims 11 and 12, claims 9 and 12 of Pat.'067 teaches a process for forming a resist pattern comprising the steps of applying the resist composition of claim 9 onto a substrate to form a coating, heat treating the coating and then exposing it to high-energy radiation or electron beams through a photomask, and optionally heat treating the exposed coating and developing it with a developer. Therefore, claims 1, 4, 9, and 12 of Pat.'067 would render obvious present inventions of claims 11 and 12.

14. Claims 9, 11, and 12 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 4, 6, and 7 of U.S. Patent No. 6,670,094 B2. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

Claim 1 of Pat.'094 states the following:

Art Unit: 1752

1. A polymer comprising recurring units of the following general formula (1-1) or (1-2) and having a weight average molecular weight of 1,000 to 500,000,



wherein R^1 and R^2 each are hydrogen or a straight, branched or cyclic alkyl group of 1 to 15 carbon atoms, R^1 and R^2 , taken together, may form a ring, wherein the combination of R^1 with R^2 is a straight, branched or cyclic alkylene group of 2 to 15 carbon atoms, R^3 is hydrogen, a straight, branched or cyclic alkyl, acyl or alkylsulfonyl group of 1 to 15 carbon atoms or a straight, branched or cyclic alkoxy carbonyl or alkoxyalkyl group of 2 to 15 carbon atoms, in which some or all of the hydrogen atoms on constituent

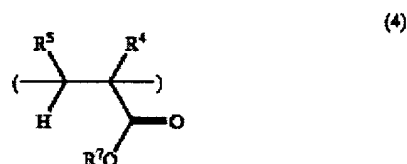
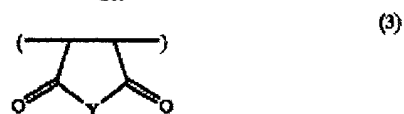
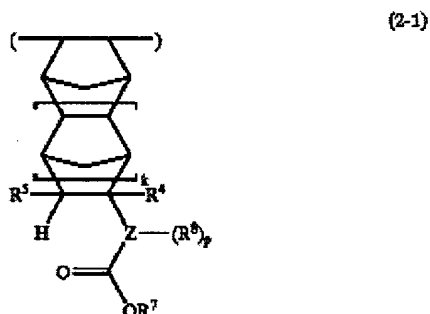
carbon atoms may be substituted with halogen atoms, with the case that all R^1 , R^2 and R^3 are hydrogen being excluded, and

k is 0 or 1.

Claim 4 of Pat.'094 states the following:

Art Unit: 1752

4. The polymer of claim 1 comprising, in addition to the recurring units of formula (1-1), recurring units of the following general formula (4) alone or in combination with recurring units of the following general formula (2-1), and recurring units of the following general formula (3):



wherein k, p, R⁴ to R⁸ and Y are as defined above.

Based on the teachings of these two claims, it would have been obvious to one of ordinary skill in the art to make the polymer of claim 1 of Pat.'094 which contains the recurring unit of formula (1-1) and the recurring unit of formula (4) alone as shown in claim 4 of Pat.'094. The recurring unit (1-1) teaches present repeat unit "x2" because when R¹-R³ of claim 1 of Pat.'094 are all H atoms, and k is 0, the structure becomes the same as that of the eleventh structure shown on pg.15 of present specification as one of the examples for the present repeat unit "x2". The recurring unit (4) of Pat.'094 teaches present repeat unit "d" because R⁷ is an acid labile group. Therefore, claims 1 and 4 of Pat.'094 would render obvious present invention of claim 9.

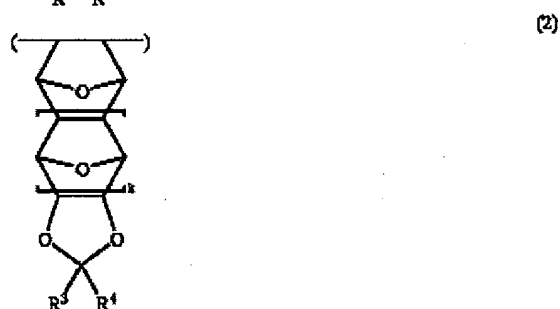
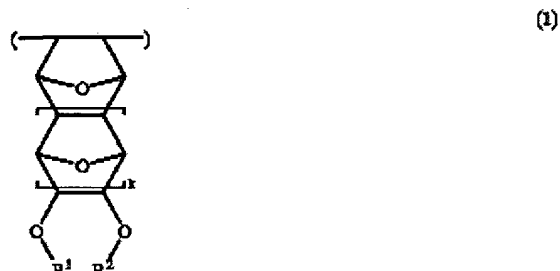
With respect to present claims 11 and 12, claims 6 and 7 of Pat.'094 teach a process for forming a resist pattern comprising the steps of applying the resist composition of claim 6 onto a substrate to form a coating, heat treating the coating and then exposing it to high-energy radiation or e-beams through a photomask, and optionally heat treating the exposed coating and developing it with a developer. It would have been obvious to one of ordinary skill in the art to use the polymer of claim 1 of Pat.'094 which contains the recurring unit of the formula (1-1) and the recurring unit of the formula (4) in the resist composition and use the composition in the process described in claim 7 of Pat.'094 with a reasonable expectation of obtaining a resist pattern. Therefore, claims 1, 4, 6, and 7 of Pat.'094 would render obvious present inventions of claims 11 and 12.

15. Claims 9, 11, and 12 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 4-6 of U.S. Patent No. 6,673,517 B2. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

Claim 1 of Pat.'517 states the following:

Art Unit: 1752

1. A polymer comprising recurring units of the following general formula (1) and/or (2) and having a weight average molecular weight of 1,000 to 500,000:



wherein R^1 and R^2 each are hydrogen, a straight, branched or cyclic alkyl, acyl or alkylsulfonyl group of 1 to 15 carbon

atoms or a straight, branched or cyclic alkoxy carbonyl or alkoxyalkyl group of 2 to 15 carbon atoms, in which some or all of the hydrogen atoms on constituent carbon atoms may be substituted with halogen atoms,

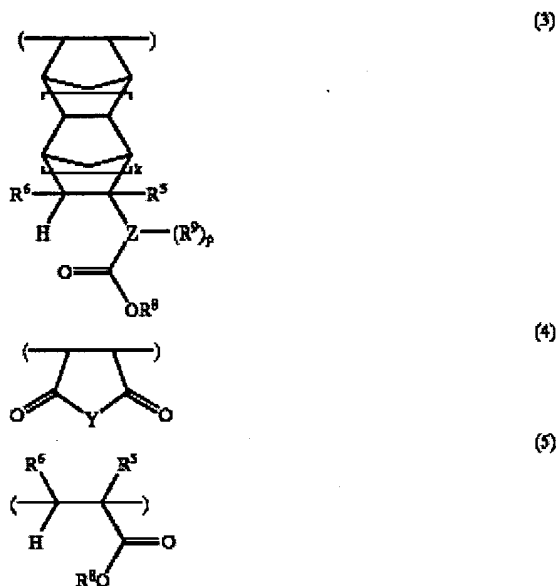
R^3 and R^4 each are hydrogen, a straight, branched or cyclic alkyl or alkoxy group of 1 to 15 carbon atoms, or a straight, branched or cyclic alkoxyalkyl group of 2 to 15 carbon atoms, in which some or all of the hydrogen atoms on constituent carbon atoms may be substituted with halogen atoms, and R^3 and R^4 may together bond with the carbon atom to form an aliphatic ring having 4 to 8 carbon atoms, or R^3 and R^4 , taken together, may be an oxygen atom,

k is 0 or 1.

Claim 4 of Pat.'517 states the following:

Art Unit: 1752

4. The polymer of claim 1 comprising, in addition to the recurring units of formula (1) and/or (2), recurring units of the following general formula (5) alone or in combination with recurring units of the following general formula (3), and recurring units of the following general formula (4):



wherein k , p , R^5 to R^9 and Y are as defined above.

Based on the teachings of these two claims, it would have been obvious to one of ordinary skill in the art to make the polymer of claim 1 of Pat.'517 which contains the recurring unit of formula (1) and the recurring unit (5) alone as shown in claim 4 of Pat.'517. The recurring unit of formula (1) teaches present repeat unit "x2" because when R^1 and R^2 of claim 1 of Pat.'517 are H atoms, and k is 0, the structure becomes the same as that of the twenty-sixth structure shown on pg.16 of present specification as one of the examples for the present repeat unit "x2". The recurring unit of formula (5) teaches present repeat unit "d" because R^8 of claim 4 of Pat.'517 is an acid labile group. Therefore, claims 1 and 4 of pat.'517 would render obvious present invention of claim 9.

With respect to present claims 11 and 12, claims 5 and 6 of Pat.'517 teach a process for forming a resist pattern comprising the steps of applying the resist composition of claim 5 onto a substrate to form a coating, heat treating the coating and then exposing it to high-energy radiation or e-beams through a photomask, and optionally heat treating the exposed coating and developing it with a developer. It would have been obvious to one of ordinary skill in the art to use the polymer of claim 1 of Pat.'517 which contains the recurring unit of the formula (1) and the recurring unit of the formula (5) in the resist composition and use the composition in the process described in claim 6 of Pat.'517 with a reasonable expectation of obtaining a resist pattern. Therefore, claims 1 and 4-6 of Pat.'517 would render obvious present inventions of claims 11 and 12.

Allowable Subject Matter

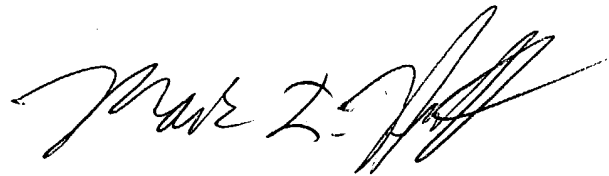
16. Claims 1 and 3-5 are allowed. None of the cited prior arts (either alone, or in combination) teaches or fairly suggests the present invention of claim 1 which requires that at least two of the repeating units x1, x2, and x3 be present in the polymer.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is 571-272-1333. The examiner can normally be reached on Monday-Friday from 9:00 am EST to 5:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F. Huff, can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

S. J. Lee
S. Lee
March 26, 2004



MARK F. HUFF
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

S. J. Lee
Sin J. Lee
Patent Examiner
Technology Center 1700